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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/963,253      | 09/25/2001  | Mark S. Bohn         | RM375n              | 9381             |

7590 08/10/2004

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| EXAMINER |
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DUONG, THANH P

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| ART UNIT | PAPER NUMBER |
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1764

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/963,253

Applicant(s)

BOHN ET AL.

Examiner

Tom P Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 23-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1/15/02, 11/21/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 23, 25, and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benham et al. (5,763,716) in view of Sorensen (5,666,800) and Benham et al. (6,534,552). Regarding claims 23 and 25, Benham '716 discloses an apparatus (Figure 1) for producing carbon dioxide (Col. 3, line 48) and hydrocarbons having an average H:C atom ratio of 2 or greater (Col. 2, lines 9-11) from carbon-bearing feedstocks (Col. 2, lines 15-18) having an H:C ratio of less than 2, comprising: a) a partial oxidation reactor (figure 2, Col. 11, lines 56-58) for reacting a carbon-bearing feedstock (methane) with an oxidizing gas (oxygen) and steam (high pressure steam) to produce a mixture of gases containing hydrogen, carbon monoxide and carbon dioxide (Col. 2, lines 39-43) having a molar ratio of H<sub>2</sub>:CO of greater than 0.6 (Col. 4, lines 24-29); b) a slurry Fischer-Tropsch synthesis reactor (15) for reacting the mixture of gases containing hydrogen and carbon monoxide, said reactor further containing a catalyst (Col. 12, lines 20-24) which catalyzes both hydrocarbon-forming reactions and the water gas shift reaction; c) means for transporting the gases

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from the partial oxidation reactor to the Fischer-Tropsch synthesis reactor (conventional gas blower); d) means for condensing the product hydrocarbons (distillation column, Figure 3) from the Fischer-Tropsch synthesis reactor from unreacted hydrogen, carbon monoxide and other gases (tail gases); e) means for separating the product hydrocarbons into suitable fractions (distillation column, Figure 3); Benham '716 fails to disclose h) means for recovering heat from at least the partial oxidation and Fischer-Tropsch reactors and generating steam; and i) a combined cycle plant comprising gas and steam turbines for the production of power from products generated by the Fischer-Tropsch reactor and the steam generated in (h). Sorensen '800 teaches the heat recovery 111 recovers the heat from the gasifier 118 (partial oxidation unit, Col. 5, lines 56-60) and generates steam (via line 30) to expand to a turbine 113, which drives electric power to generate electricity 115 (Col. 4, lines 42-44). With respect to means for separating at least one of hydrogen and carbon dioxide from the tail gases and means for recycling at least a portion of the separated hydrogen to the inlet of the partial oxidation reactor. Benham '716 discloses the tail gas is recycled back to a reformer (Fig. 7) or partial oxidation unit, POX (Fig. 2) but fails to disclose the hydrogen is separated from the tail gas and recycled back to the partial oxidation unit (POX) or reformer. Benham '552 teaches the tail gas 22 is fed to the hydrogen removal unit 23 to remove the hydrogen from the tail gas and the hydrogen 25 is recycled back to the POX or ATR (Col. 5, lines 41-49). The recycling of the hydrogen 25 to the POX or ATR increased hydrocarbon yields and reduced oxygen consumption (Abstract). Thus, it would have been obvious

in view of Benham '552 to one having ordinary skill in the art to modify the apparatus of Benham '716 with a hydrogen recycled stream to the POX as taught by Benham '552 in order to increase hydrocarbon yields and reduce oxygen consumption. Regarding claims 27-28, Benham '716 discloses the iron-based catalyst for the catalyst slurry (Col. 8, lines 57-60). Regarding claim 29, Benham '716 discloses the catalyst is an unsupported precipitated iron catalyst promoted with copper and potassium (Col. 9, lines 1-4). Regarding claim 30, Benham '716 discloses a source of natural gas and means for introducing the natural gas into at least one of the partial oxidation reactor as shown in Figure 2, but fails to disclose the natural gas is introduced to the turbine of the combined cycle plant. Sorensen '800 teaches the natural gas (via line 43) is fed to the combustor 105 to facilitate the firing of the gas turbine combustor 105 and the exhaust expands in the turbine, which drives the electric power generator 109. Thus, it would have been obvious in view of Sorensen to one having ordinary skill in the art to modify the apparatus of Benham '716 with a natural gas feeding to the gas turbine combustor to facilitate the firing of the gas turbine combustor.

2. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Benham et al. '716 in view of Sorensen '800 and Benham et al.'552) as applied to claim 23 above, and further in view of Derr, Jr. et al. (4,684,756) and Agee et al. (6,277,894). The applied references fails to disclose a hydrocracking reactor and means for transporting a wax fraction of the hydrocarbon products and a portion of the hydrogen separated from the tail

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gases to said hydrocracking reactor to produce additional hydrocarbon fractions. Derr '756 discloses a hydrocracking reactor 10 to convert wax (9) into fuel gas, gasoline, and distillate (Col. 5, lines 55-57) and hydrogen from the tail gas (via line 6) is recycled to the hydrocracking 10 to facilitate conversion of waxy components into gasoline and distillate. Agee '895 makes it clear that if the hydrogen separating device is included then the hydrogen is separated from the synthesis gas or tail gas to assist in the hydrocracking system (Col. 7, lines 2-9). Thus, it would have been obvious in view of Derr '756 and Agee '895 to one having ordinary skill in the art to include a hydrocracking unit as taught by Derr with hydrogen recycled stream as taught by Derr and/or Agee in order to facilitate the conversion of the waxy components into gasoline and distillates.

3. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Benham et al. '716 in view of Sorensen '800 and Benham et al.'552) as applied to claim 23 above, and further in view of Yarrington et al. (5,023,276). The applied references fails to disclose the slurry reactor is steam cooled. Yarrington '276 teaches the effluent from the slurry F-T synthesis reactor 58 can be cooled by the synthesis gas thru a heat exchanger 56. Thus, it would have been obvious in view of Yarrington '276 to one having ordinary skill in the art to modify the apparatus of the applied references with a steam cooler or heat exchanger as taught by Yarrington in order to cool the effluent from the F-T reactor.

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4. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Benham et al. '716 in view of Sorensen '800 and Benham et al.'552) as applied to claim 23 above, and further in view of Egan (4,092,825). The applied references fail to disclose means for separating acid gases from the products of partial oxidation reactor. Egan '825 teaches the synthesis gas is purified in the purification zone 15 to remove impurities such as H<sub>2</sub>S, CO<sub>2</sub>, and etc. in order to prevent poisoning of the downstream Fisher-Tropsch catalyst (Col. 5, lines 7-15). Thus, it would have been obvious in view of Egan to one having ordinary skill in the art to modify the apparatus of the applied references with acid gases removal means as taught by Egan in order to prevent poisoning of the F-T catalyst.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom P Duong whose telephone number is (571) 272-2794. The examiner can normally be reached on 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Duong  
August 4, 2004

*TD*



Glenn Caldarola  
Supervisory Patent Examiner  
Technology Center 1700